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EXAMINER

WHITE, DENNIS MICHAEL

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1797

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/583,263	Applicant(s) MARUO ET AL.	
	Examiner DENNIS M. WHITE	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 March 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
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| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>02/03/2009</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Amendments filed on 3/12/2009 are noted. Claims 1, 7, 18, and 21 are amended. Currently claims 1-36 are pending.
2. Claims 1-3, 5, and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Omatsu (JP 2001343380 A) in view of Fryer et al (US 2001/0036670).
3. Regarding claims 1-3, 5, 13-15 Omatsu teaches an ozone gas sensing element comprising: a changing layer made of paper, glass, textiles, or fibrous sheets ("a porous material" "porous material is transparent") and an ink that contains anthraquinone dye for ozone detection ("sensing agent formed in pores of said porous material" "said sensing agent contains a dye which changes absorption in a visible region by reacting with ozone") (Para. 0011-014); and an overcoat layer ("light-transmitting gas selective permeable film which covers a surface of said porous material") (Para. 0027), wherein, the overcoat ("said gas selective permeable film") comprises polyvinyl alcohol ("an organic polymer which uses, as a monomer, a compound made of a chainlike molecule containing a vinyl group") (Para. 0028). Omatsu is silent about the overcoat is PMMA ("said gas selective permeable film has a selectively permeability that allows permeation of ozone gas while suppressing penetration of nitrogen dioxide gas").

Fryer et al teach an apparatus for monitoring the concentration of an oxidative gas. The device comprises a gas permeable pouch comprising a carrier 12 that can be PMMA or polyvinylalcohol, etc (Para. 0018, Fig. 1C). It is desirable to provide a layer over the sensing layer that is gas permeable.

Simple substitution of one known element for another to obtain predictable results is held to be obvious. Therefore, it would have been obvious to one of ordinary skill in the art to substitute the PVA overcoat layer of Omatsu with the PMMA layer of Fryer et al because they are known layers to protect the sensing layer and to provide a gas permeable layer for gas sensing.

Regarding claim 14, Omatsu/Fryer teaches the organic polymer comprises a polymer lactic acid copolymer (Para. 0028).

Regarding claim 16, Omatsu/Fryer teach polymethylmethacrylate. Omatsu/Fryer are silent that PMMA has a molecular weight of not less than 100,000. It is desirable for the PMMA to have a high molecular weight because it allows for the transition temperature to be higher to increase the glass transition temperature.

Therefore it would have been obvious to one of ordinary skill in the art to provide the PMMA of Omatsu/Fryer with the polymethylmethacrylate that has a molecular weight of not less than 100,000 because the high molecular weight allows for the glass transition temperature to be higher which allows for a more stable overcoat layer.

4. Claims 4, 6-12, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Omatsu (JP 2001343380 A) in view of Fryer et al (US 2001/0036670) and further in view of Maruo (US 2004/0131501 A1).

Omatsu/Fryer teach the limitations of claims 1-3, 5, 13-14 as per above.

Regarding claims 4, 6-8, 10-11, 17, Omatsu/Fryer are silent about the pore size, containing a humectant such as glycerin, containing acetic acid or a pH buffering agent.

Maruo et al teach an ozone gas sensing element comprising a dye solution prepared by dissolving, in water, indigo carmine disodium salt as a dye (stain), acetic acid as an acid, and glycerol as a hygroscopic compound. The indigo carmine ("dye contains an indigo ring") disodium salt concentration is 0.4%, the acetic acid concentration is 1 N, and the glycerol ("glycerin") concentration is 10.0% ("which said dye and said humectant whose wt % is 10% to 50% are dissolved") (Para. 0158 and 0165). The sensing element is deposited in the pores of a porous material, wherein the pores are 20nm or less ("thereby impregnating said porous material with said aqueous solution, and drying said porous material") (Para. 0063).

It is desirable to have a pore size of 20nm or less because when the sensing element is made of porous glass (borosilicate glass), light passes in the visible light region (350 nm to 800 nm) in measurement of the transmission spectrum in the UV visible wavelength region (wavelength: 200 nm to 2,000 nm) by setting the average pore diameter to 20 nm or less. For a larger average pore diameter, an abrupt decrease in transmittance in the visible region is observed (Para 0063).

Therefore it would have been obvious to one of ordinary skill in the art as motivated by Maruo to use the pore size of 20nm or less in the porous material of Omatsu in order to provide adequate transmittance of visible light.

It is desirable to use glycerol ("a humectant") because the hygroscopic compound contains water, even addition of moisture upon a humidity change has little influence. Thus, disturbance of humidity can be reduced (Para. 0165).

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Therefore it would have been obvious to one of ordinary skill in the art as motivated by Maruo to use glycerol in order to avoid the affect of humidity on the ozone measurements.

It is desirable to use acetic acid because it increases the absorbance around 600 nm. (Para. 0124 and 0155).

Therefore it would have been obvious to one of ordinary skill in the art as motivated by Maruo to use acetic acid in the device of Omatsu in order to increase the absorbance around 600nm, which is an optimal wavelength to detect a color change in dyes that react with ozone.

It is desirable to use indigo carmine as the dye to detect ozone because it is a dye that changes in the absorbance of the visible region upon reaction with ozone gas and is not affected by other acid gases in the atmosphere because the carbon-carbon double bond in an indigo ring contained in the dye is only broken by ozone gas deposited in the pores of the sensing element almost free from disturbance of an acid gas, and the electron state of the dye molecule changes to change the absorption spectrum of the visible region. (Para. 0150).

Therefore it would have been obvious to one of ordinary skill in the art as motivated by Maruo to substitute indigo carmine for the anthraquinone dye to avoid the affect of other acid gases in the atmosphere in ozone detection.

Regarding claims 9, Omatsu/Maruo teach the percent weight of glycerin is 10%. Omatsu/Maruo do not teach the wt% of glycerin is 30%. The percent of hygroscopic

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material is a result effective variable that depends on the humidity. It is desirable to increase the amount of glycerin if the humidity is higher.

Therefore it would have been obvious to one of ordinary skill to optimize the device of Omatsu/Maruo by increasing the glycerin wt% from 10% to 50% in order to reduce the effect of humidity on ozone sensing.

Regarding claims 12, Omatsu/Maruo teach the acid can comprise a buffer solution such as phosphoric acid and sodiumdihydrogenphosphate dehydrate ("solution is made acidic by a pH buffering agent made of an acid and a salt thereof") (Maruo: Para. 0176).

5. Claims 18-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Omatsu (JP 2001343380 A) in view of Maruo (US 2004/0131501 A1).

Regarding claims 18-22, 24-26, 32, Omatsu teaches an ozone gas sensing element comprising: a changing layer made of paper, glass, textiles, or fibrous sheets ("a porous material" "porous material is transparent") and an ink that contains anthraquinone dye for ozone detection ("sensing agent formed in pores of said porous material" "said sensing agent contains a dye which changes absorption in a visible region by reacting with ozone") (Para. 0011-014); and an overcoat layer ("light-transmitting gas selective permeable film which covers a surface of said porous material") (Para. 0027), wherein, the overcoat ("said gas selective permeable film") comprises polyvinyl alcohol ("an organic polymer which uses, as a monomer, a compound made of a chainlike molecule containing a vinyl group") (Para. 0028). Omatsu is silent about the overcoat is PMMA ("said gas selective permeable film has a

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selectively permeability that allows permeation of ozone gas while suppressing penetration of nitrogen dioxide gas”).

Omatsu are silent about the pore size, containing a humectant such as glycerin, containing acetic acid or a pH buffering agent.

Maruo et al teach an ozone gas sensing element comprising a dye solution prepared by dissolving, in water, indigo carmine disodium salt as a dye (stain), acetic acid as an acid, and glycerol as a hygroscopic compound. The indigo carmine (“dye contains an indigo ring”) disodium salt concentration is 0.4%, the acetic acid concentration is 1 N, and the glycerol (“glycerin”) concentration is 10.0% (“which said dye and said humectant whose wt % is 10% to 50% are dissolved”) (Para. 0158 and 0165). The sensing element is deposited in the pores of a porous material, wherein the pores are 20nm or less (“thereby impregnating said porous material with said aqueous solution, and drying said porous material”) (Para. 0063). The claim limitation, “wherein said humectant is operable to accelerate a reaction between the dye and ozone” is considered an inherent property since the humectant claimed is taught by Maruo et al.

It is desirable to have a pore size of 20nm or less because when the sensing element is made of porous glass (borosilicate glass), light passes in the visible light region (350 nm to 800 nm) in measurement of the transmission spectrum in the UV visible wavelength region (wavelength: 200 nm to 2,000 nm) by setting the average pore diameter to 20 nm or less. For a larger average pore diameter, an abrupt decrease in transmittance in the visible region is observed (Para 0063).

Therefore it would have been obvious to one of ordinary skill in the art as motivated by Maruo to use the pore size of 20nm or less in the porous material of Omatsu in order to provide adequate transmittance of visible light.

It is desirable to use glycerol ("a humectant") because the hygroscopic compound contains water, even addition of moisture upon a humidity change has little influence. Thus, disturbance of humidity can be reduced (Para. 0165).

Therefore it would have been obvious to one of ordinary skill in the art as motivated by Maruo to use glycerol in order to avoid the affect of humidity on the ozone measurements.

It is desirable to use acetic acid because it increases the absorbance around 600 nm. (Para. 0124 and 0155).

Therefore it would have been obvious to one of ordinary skill in the art as motivated by Maruo to use acetic acid in the device of Omatsu in order to increase the absorbance around 600nm, which is an optimal wavelength to detect a color change in dyes that react with ozone.

It is desirable to use indigo carmine as the dye to detect ozone because it is a dye that changes in the absorbance of the visible region upon reaction with ozone gas and is not affected by other acid gases in the atmosphere because the carbon-carbon double bond in an indigo ring contained in the dye is only broken by ozone gas deposited in the pores of the sensing element almost free from disturbance of an acid gas, and the electron state of the dye molecule changes to change the absorption spectrum of the visible region. (Para. 0150).

Therefore it would have been obvious to one of ordinary skill in the art as motivated by Maruo to substitute indigo carmine for the anthraquinone dye to avoid the affect of other acid gases in the atmosphere in ozone detection.

Regarding claims 18-19, Omatsu/Maruo teach the substrate can be woody material, paper, or other fibrous sheets ("sheet-like carrier made of fibers" "made of cellulose") (Omatsu: 0011).

Regarding claims 23, Omatsu/Maruo teach the percent weight of glycerin is 10%. Omatsu/Maruo do not teach the wt% of glycerin is 30%. The percent of hygroscopic material is a result effective variable that depends on the humidity. It is desirable to increase the amount of glycerin if the humidity is higher.

Therefore it would have been obvious to one of ordinary skill to optimize the device of Omatsu/Maruo by increasing the glycerin wt% from 10% to 50% in order to reduce the effect of humidity on ozone sensing.

Regarding claim 27, Omatsu/Maruo teach the acid can comprise a buffer solution such as phosphoric acid and sodiumdihydrogenphosphate dehydrate ("solution is made acidic by a pH buffering agent made of an acid and a salt thereof") (Maruo: Para. 0176).

Regarding claim 28, Omatsu/Maruo teach the ozone indicator can comprise a changing layer, a non-changing layer, and one layer of overcoat layers , or they may laminate two or more layers, respectively. ("plurality of ozone sensing sheets") (Omatsu: Para. 0037).

Regarding claims 29-32, Omatsu/Maruo teach the overcoat ("a gas amount limiting layer formed on a surface of said ozone sensing sheet") is formed above some

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of the changing layer ("including a hole" "a gas amount limiting cover formed to cover said ozone sensing sheet, and including an opening in a portion thereof"). There can be a non-changing layer on the changing layer that is covered by the overcoat.

("characterized by further comprising a gas permeable film covering the opening")

(Para. 0026 and 0039-0041). Omatsu/Maruo are silent about a plurality of holes. The Courts have held that the mere duplication of parts, without any new or unexpected results, is within the ambit of a person of ordinary skill in the art. See *In re Harza*, 124 USPQ 378 (CCPA 1960).

Therefore, it would have been obvious to a person of ordinary skill in the art to incorporate a plurality of holes with the apparatus of Omatsu/Maruo in order to have multiple sites where the changing layer is exposed to ozone for detection.

Regarding claim 33, Omatsu/Maruo teach the polymer is polyacrylic acid ("said monomer comprises at least one of acrylic acid, acrylonitrile, methacrylic acid, methyl methacrylate, vinyl chloride, and vinylidene chloride") (Para. 0028).

Regarding claim 34, Omatsu/Maruo teach the organic polymer comprises a copolymer (Para. 0028).

Regarding claims 35-36, Omatsu/Maruo teach the organic polymer comprises acrylic resin, polyacrylic acid, polyvinyl alcohol, vinyl acetate resin. Omatsu/Maruo are silent about the organic polymer comprises the acrylic resin polymethylmethacrylate that has a molecular weight of not less than 100,000. It is held to be obvious to select a well known plastic to make a container of a type made of plastics prior to the invention (*In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960)). It is desirable for the organic

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polymer to be the acrylic resin polymethylmethacrylate that has a molecular weight of not less than 100,000 because it is a known organic polymer that is transparent (to allow for reading of the changing layer) and the high molecular weight allows for the transition temperature to be higher to increase the glass transition temperature.

Therefore it would have been obvious to one of ordinary skill in the art to substitute the acrylic resin of Omatsu/Maruo with the well known acrylic resin polymethylmethacrylate that has a molecular weight of not less than 100,000 because it is transparent (to allow for reading of the changing layer) and the high molecular weight allows for the glass transition temperature to be higher which allows for a more stable overcoat layer.

Response to Arguments

6. Claim rejections under 112 second paragraphs have been withdrawn in view of the claim amendments.

7. Applicant's arguments with respect to claims 1-3, 5, 13, and 14 have been considered but are moot in view of the new ground(s) of rejection. The new rejection includes a layer (PMMA) that has the properties of a gas selective permeable film that allows penetration of ozone gas while suppressing penetration of nitrogen dioxide gas.

8. Applicant's arguments filed on 3/12/2009 have been fully considered but they are not persuasive.

Applicants argue that Maruo does not teach the humectant is operable to accelerate a reaction between the dye and ozone. It is noted that the humectant

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claimed is taught by Maruo et al and therefore the inherent property of accelerating a reaction would be present.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DENNIS M. WHITE whose telephone number is (571)270-3747. The examiner can normally be reached on Monday-Thursday, EST 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Lyle A Alexander/
Primary Examiner, Art Unit 1797

/dmw/